

## APPENDIX C

### INVESTIGATION DOCUMENTATION (Utilizing OSHA CPL 2.113 Format)

#### 1. PERSONAL DATA - VICTIM.

- a. Name - David J. Liston
- b. Address(es)  
  
1513 Gaffney Road (Ft. Wainwright duty station)  
Ft. Wainwright, Alaska 94703
- c. Telephone -  
907-356-5540 (Ft. Wainwright duty station)
- d. Age - 28. Date of Birth - April 17, 1972. Height: 5' 7". Weight: 190 pounds.
- e. Sex - Male
- f. Job Title - Forestry Technician (Smokejumper)  
  
Grade/Series - GS-0462-06 (180 Day Appointment)
- g. Date of Employment - April 23, 2000

Service Computation Date (April 30, 1996) Indicates total time in Federal Employment. Entered Federal Employment May 16, 1993.

- h. Time in Position - Six (6) Days

Employed as a Smokejumper since April 22, 1998

- i. Training for Job being performed at time of accident

#### **David J. Liston Training and Experience:**

Forestry Aid (GS-0462-03) - Fire Fighter position

U.S. Forest Service. May 16, 1993- November 11, 1993

Forestry Aid (GS-0462-03) - Fire Fighter position

U.S. Forest Service - May 1, 1994 - October 16, 1994

FTN Status October 16, 1994 - April 4, 1995

Forestry Aid (GS-0462-03) - Fire Fighter position  
U.S. Forest Service - April 16, 1995 - May 13, 1995

Forestry Technician (GS-0462-04) - Fire Crew Member Midnight Suns Hot Shots (Seasonal Appointment)

BLM, AFS - May 22, 1995 - November 15, 1995

The following is an excerpt from Position Description HS9435:

“Participates in fire and safety training in the techniques, practices, and methods of fire suppression and in the safe, efficient operation and use of tools, equipment and vehicles used in fireline activities, with emphasis on those used in the particular function to which assigned. Participates in crew proficiency checks and drills. Participates in safety sessions and fire critiques. Ensures own and others’ welfare and safety in all aspects of the assignments.”

Knowledge Required by the Position: Must have the knowledge, skills and abilities specified in the IGS qualifications standard for this position and grade level.

This firefighting position requires strenuous physical exertion on a recurring basis. The employee must meet the established physical requirements for the position. This position is subject to the arduous physical requirement of the GS-462/455 standards.”

Forestry Technician (Fire Crew) -(GS-0462-05)

(Seasonal Appointment) - Position No. HS9502

BLM, AFS, Hot Shot Crew - May 12, 1996 - September 27, 1996

(Experience commensurate with GS-0462-04 position with one year experience at that level, with two seasons completed on the Hot Shot Crews).

Lead Range/Forestry Technician (Fire Suppression)(GS-0462-06)

(Seasonal Appointment) - Position No. HS9605

BLM, AFS, Hot Shot Crew - April 13, 1997 - August 29, 1997

(Experience commensurate with GS-0462-05 position with one year experience at that level, with one season completed on the North Star Hot Shot Crew).

Forestry Technician (Smokejumper) (GS-0462-05)

(Seasonal Appointment) - Position No. SJ9518

BLM, AFS, Smokejumper Operations - April 22, 1998 - September 21, 1998.

The following is an excerpt from Position Description FSS10103:

“INTRODUCTION This position description is intended for use throughout the BLM for temporary seasonal positions.

MAJOR DUTIES Primary purpose is to parachute into inaccessible areas for the purpose of suppressing wildfires...

Receives extensive training in the use of parachutes in jumping over forest and mountainous terrain landing in timber, open, or on rough ground. Learns the use of smokejumper parachute equipment, parachute deployment, emergency procedures, and techniques of parachuting into rugged timber terrain...

1. Knowledge Required by this Position Must have the knowledge, skills and abilities specified in the IGS qualifications standard for this position and grade level. The incumbent of this position is required to have prior firefighting experience as stated in the smokejumper standards...

2. Supervisory Controls Works under the close supervision of skilled smokejumpers and squad leaders. Work guidance and direction is provided requiring the use of standard procedures and practices...

4. Complexity The employee must be able to carry out a variety of parachuting and firefighting operations following establish procedures and precedents...

5. Physical Demands the work involves extreme physical exertion in parachuting to fires, carrying 110-pound packs for up to 10 miles through rugged terrain, and for working up to 20-hour shifts on fire lines. This position is subject to the arduous physical requirements for smokejumpers included in the GS-462 standards...

6. Work Environment The majority of the work is performed out-of-doors in a wide variety of weather and terrain conditions or in a crowded smokejumper airplane without seats or seatbelts. Employee is often assigned to field sites in isolated locations often in primitive conditions. This work requires a variety of safety gear and precautions."

Forestry Technician (Smokejumper)(GS-0462-06)

(Seasonal Appointment) - Position No. ~~SJ9642~~ 10104AM

BLM, AFS, Smokejumper Operations - April 25, 1999 - September 27, 1999.

The following is an excerpt from Position Description FSS10104:

INTRODUCTION This position description is intended for use throughout the BLM for temporary seasonal positions...

MAJOR DUTIES ... Serves as a highly trained and skilled member of a parachuting fire suppression squad which jumps over forest and mountainous terrain, landing in timber, open, or on rough ground...may supervise one or more firefighters who accompany him on fires... Completes forms connected with parachute jumps... When not involved in fireline activities, participates in a wide range of fire support activities including parachute rigging and repair, paracargo rigging, and construction and repair of assorted smokejumper equipment.

Receives training in basic smokejumper skills including aircraft exits, parachute manipulation, landing techniques, and tree letdown procedures. Participates in a daily physical conditioning

program maintain a physical condition necessary to perform the duties of the position... May receive advance training in various specialties that include paracargo, fireline explosives, emergency medical technician, and parachute loft.

1. Knowledge Required of the Position Must have the knowledge, skills and abilities specified in the qualifications standard for this position and grade level. Prior firefighting experience and at least one season of smokejumping experience is required. Must be experienced in the use of smokejumper parachute equipment, parachute deployment, emergency procedures, and techniques of parachuting into rugged timbered terrain...

2. Supervisory Controls Work assignments are generally given by the supervisor through a work leader in terms of current plans and policies existing for the use of smokejumpers. Explicit instructions on work methods and procedures to be used are not given unless technical problems of an unprecedented nature occur. The employee works independently as an experienced team member, often serving as a squad leader for several inexperienced team member. Work is reviewed in process and upon completion for adequacy of the efforts expended and the results obtained.

3. Guidelines Guidelines include training exercises, past experiences, equipment handbooks, BLM and USFS manuals, and Operations Handbooks. Since every fire is unique, the employee must typically select from a number of guides and adapt procedures to meet field conditions.

4. Complexity The work requires carrying out a variety of operations following established procedures and precedents making adaptations as necessary. Parachuting into rugged terrain is a complex skill requiring 120 hours of training and practice in aircraft procedures, exiting, parachute steering, landing, timber let-down, and parachute malfunctions .

5. Work Environment The majority of the work is performed out-of-doors in a wide variety of weather and terrain conditions or in a crowded smokejumper airplane without seats or seatbelts. Employee is often assigned to field sites in isolated locations often in primitive conditions. Employee risks death or serious injury during parachutes jumps, low flying cargo dropping, or firefighting. This work requires a variety of safety gear and precautions.”

Forestry Technician (Smokejumper) (GS-0462-06)  
(Seasonal Appointment) - Position No. ~~SJ9642~~ 10104AM  
BLM, AFS, Smokejumper Operations - April 23, 2000 - .

**Chief Investigators Note:** A current Job Description was not found in the employee's Official Personnel Folder. It is noted that the Supervisor was currently working on a revision and Position Description number 10104AM was in effect according to the Notification of Personnel Action (Standard Fore 50-B) effective April 23, 2000. Documentation was found to indicate employee was qualified as an experienced Smokejumper with the BLM.

Liston was Red Card Qualified:

WF-FFT1 Advanced Firefighter/Squad Boss

TS-HESM Helispot Manager

TS-SMKJ Smokejumper

Liston had completed 64 successful jumps with the BLM ram-air parachute system, and had successfully managed and deployed his reserve parachute on jump 28 following parachute malfunction. Liston's records indicate that he had completed 43 practice jumps and 21 operational or initial attack jumps. Liston had completed four successful jumps since his recent date of hire (April 23, 2000), including two on April 27, one on April 28, and one on the afternoon of April 29.

Liston completed his tower evaluations on April 25, 2000. These evaluations indicated that Liston performed "Great" on Drogue-in-Tow; "Feet apart, need to get head down to look at handles" on Spinning; "Good" on Streamer; "Good" on Horseshoe; and "Good" on last column Good.

Documentation reviewed included:

Official Personnel File

Application for Federal Employment (SF-171) dated November 3, 1998.

Liston's Jump Records

Employee Incident Qualification System

Tower Evaluations

Physical Capacity: No Medical Alert Conditions indicated on Liston's Medical Records. Liston signed his Health Screen Questionnaire (Instruction Memorandum OF&A 98-011, Attachment 1-8) on April 25, 2000, and passed the Work Capacity Record (Attachment 1-10) with a Arduous Performance Level and a test result time of 42:55 minutes. Liston's Smokejumper Physical Training records indicate complete of the 1.5 mile run in 9:17 minutes, 10 pull-ups, 35 pushups, and 60 sit-ups.

j. Employee Status

David J. Liston **Deceased**

k. Nature of Injuries -

David J. Liston -- Multiple fatal injuries resulting from fall from 3,000 feet (Pending report from Medical Examiner, State of Alaska Report).

## **2. ACCIDENT DATA.**

- a. How and why did accident occur.

Liston experienced a parachute malfunction when his reserve parachute's pilot-chute and suspension lines entangled with the main parachute's drogue (pilot-chute). This entanglement prevented either parachute from deploying. The entanglement overcame the ability of the employee to manage the event. Liston suffered multiple fatal injuries resulting from a fall from approximately 3,000 feet (pending report from Medical Examiner, State of Alaska report).

- b. Physical Layout - N/A
- c. Sketches/Drawings - See Attachment F
- d. Measurements - N/A
- e. Video/Photos - See Attachment D

## **3. EQUIPMENT INVOLVED OR PROCESS.**

- a. Machine Type - See below.
- b. Manufacturer - See below.
- c. Model - See below.
- d. Manufacturer's Instructions - See below.

### **AIRCRAFT INFORMATION**

Contract Aircraft owned by Bighorn Airways, Box 4037, Sheridan, WY 82801 (307-672-3421) under contract/ARA No. 81-0784, hired on April 5, 2000 (0800) to U.S. Department of the Interior, Office of Aircraft Services, PO Box 15428, Boise, ID 83715-5428 (208-387-5781) / 4837 Aircraft Drive, Anchorage, AK 99502-1052 (907-271-3700/3935)

Make and Model - Casa 212  
Aircraft FAA Registration No. - N117BH  
Pilot Name (PIC) - Chris Eisele  
Pilot Name (PIC) - Stoney Bauer

On April 30, 2000, the Chief Investigator requested that the aircraft be taken out of service. The aircraft returned to service on May 5, 2000.

On May 1, 2000, the Serious Accident Investigation Team requested the Office of Aircraft Services to provide an Air Safety Investigator to determine airworthiness and evaluate smokejumper equipment within the aircraft. On May 1, 2000, the Serious Accident Investigation Team requested the Anchorage Office, of the Office of Aircraft Services to provide the Technical Inspector of this aircraft to evaluate the current condition of the aircraft.

On May 2, 2000, Gary R. Davis, OAS Tech Services, Anchorage, AK 99502, (907-271-3728), Lawrence P. Brosnan, Air Safety Investigator, OAS, Boise, ID 83705 (208-387-5804), Kipp Wagner, and Leonard Wehking inspected the aircraft and smokejumper equipment.

The aircraft was found to be in good condition. All of the installed smokejumper equipment was in good working order. The cabin was clean and all equipment was secure with no sharp edges. The static line was in good condition and properly tensioned. The seats and seat belts were in serviceable condition. The jump door opening is well protected with tape. The jump door opening, airframe handle is secure. The cable mounted static lines were in serviceable condition. The outside of the aircraft was in good condition with just a few small chips in the paint just aft of the door opening, they appeared to have been caused by a fabric strap or plastic buckle.

The Investigation Team members took several pictures of the interior and exterior of the aircraft, and installed smokejumper equipment. The investigation members performed a close search of the floor area, behind and under the seats, and tail of the aircraft searching for any debris or materials from the incident (specifically pieces from broken FASTEX snap), none was located.

The aircraft cockpit voice flight recorder was removed under a Chain-of-Custody and taken to Seattle, Washington, by Brosnan, for down-loading and transferred to audio cassette by American Avionics, 7023 Perimeter Road, Boeing Field, Seattle, Washington 98108.

**PARACHUTE EQUIPMENT INVOLVED (NOTE: "Z" after the number denotes the Top Skin of the canopy is zero porosity) :**

**David J. Liston's Parachute equipment**

Parachute System Series - 200  
Ram-air Harness Number - 9012  
Ram-air Harness Model- 8801  
Ram-air Harness - Manufactured 1990

Drogue Riser or Container Number - A324Z  
Drogue Serial Number - 34984  
Drogue Model - B2002  
Drogue Type - ZP  
Drogue manufactured by - Paramedics Technology June 1998  
Placed in Service - July 5, 1998  
Drogue packed by - Doug Carrol  
Drogue pack date - March 15, 2000

Main Canopy Riser or Container Number - A277  
Main Canopy Serial Number - BLM-7-0611  
Main Canopy Model Number - 8910

Main Canopy Type - Trilobe

Main Canopy manufactured by - Quantum Parachutes on June 7, 1991

Place in Service - June 13, 1991

Main Canopy packed by - Lance Clouser

Main Canopy packed date - March 22, 2000

Reserve Canopy Riser or Container Number - A224R

Reserve Canopy Serial Number - MRS 9234

Reserve Canopy Model - MT-1S

Reserve Canopy manufactured by - Paraflite February 1998

Placed in Service - June 25, 1998

Reserve Canopy packed by - Lance Clouser

Reserve Canopy packed date - March 28, 2000

e. Kind of Process

Training / Parachute Jump / Wildland Fire Suppression Training / Natural Resource Protection / BLM Smokejumper Refresher Training / Government Activity / Federal Government

f. Condition

Aircraft condition is in good condition and serviceable, no defects noted. Smokejumper equipment in aircraft is in good condition and serviceable, no defects noted.

Liston's harness, drogue, main parachute, reserve pilot-chute and reserve parachute are in good condition and meet specifications; defects noted are due to contact (minor friction burns on reserve pilot-chute bridle and suspension lines and drogue parachute bridle) and post-contact causes (impact and EMS) a small two- inch tear was found on the drogue outer perimeter.

g. Misuse - No evidence of equipment misuse was identified.

h. Maintenance Program

The maintenance program of the aircraft was not evaluated by the Investigation Team since it was determined not be a factor.

Inspection records were not requested by the Investigation Team for the harness. There are no requirements for maintenance records.

Liston's main parachute was inspected and packed on March 22, 2000, within the 120 days before the date of its use as required by 14 CFR 105.43(a)(1).



Liston's reserve parachute was inspected and packed on March 28, 2000, within the 120 days before the date of its use as required by 14 CFR 105.43(a)(2)(i).

i. Equipment Inspection (Logs, Reports)

LOFT MASTER LOG (4 pages)

Loft Record Rigging Log Book of Lance Clouser (4 pages)

Parachute Repair Record (BIFC Form 9210-15) for BLM Riser or Container Numbers.

j. Warning Devices (Detectors)

Not Applicable

k. Tasks Performed

Training Refresher for Parachute Smokejumper Operations.

l. How often equipment used

The BLM began researching an alternate parachute to the FS-10 round canopy for smokejumping in 1978. Equipment development and testing began in 1979 and continued through 1981. Smokejumper training and field testing started in 1982. The first operational fire jumps began in 1982. Further refinements in the ram-air equipment took place from 1982 through 1990. By 1990, the current harness design was finalized resulting in the ram-air harness model 8801. Rookie BLM smokejumper classes trained exclusively on the ram-air system for the first time in 1991. BLM smokejumpers currently use the system finalized in 1990 (BLM ram-air parachute system series 200). Approximately 30,000 BLM ram-air jumps have been completed.

The main parachute used is the Trilobe, a 330-square foot, seven-cell ram-air parachute. The ram-air parachute is a semi-rigid, airfoil-shaped canopy designed for maneuverability and target accuracy. The ram-air main parachute follows this sequence when opening:

1. Static line deploys drogue.
2. Drogue gives smokejumper an upright stable body position.
3. Drogue release handle is pulled by smokejumper. Released drogue pulls main parachute deployment bag (D-bag) off smokejumper's back.
4. Lines pay out (rubber retainer bands keep deployment bag closed until line stretch is complete).
5. D-bag is pulled off canopy.
6. Canopy inflates.

The reserve parachute, MT-1S by Paraflite, is a 270-square foot, five-cell ram-air canopy. This model was originally used as a main parachute during the research and development of the ram-air

system from 1981 through 1984. The attachment of the reserve to the ram-air harness using “droop risers” allows the parachute to ride in the same position as the main when deployed.

The drogue parachute has two primary functions. First, the drogue serves to stabilize the smokejumper in an upright position after exit. The upright position avoids suspension line entanglements with the smokejumper during deployment of the main parachute. Secondly, the drogue serves as a pilot-chute for the main canopy. After the smokejumper pulls the drogue release handle, the drogue parachute is designed release from the harness and pull the main parachute out of its container.

The 3-ring *drogue* release system allows parachutists to release the drogue by pulling a single handle. The 3-ring *main* release system allows the parachutists to jettison a malfunctioning main canopy.

- m. Energy sources and disconnecting means identified

Not Applicable

- n. Supervision or instruction provided to employees involved in accident

See BLM *Ram-Air Training Manual*.

#### 4. **Witnesses** (Public, Fellow Employees, Management)

#### 5. **Safety and Health Program.**

Does employer have a safety or health program -

Yes, in place.

Does the program address the type of hazard which resulted in the fatality/  
catastrophe -

The smokejumper program address parachute malfunctions but not dual  
malfunction of main and reserve system